

156
THE
PROCEEDINGS
OF
THE PHYSICAL SOCIETY

FROM JANUARY 1944 TO NOVEMBER 1944

VOLUME 56

Published by
THE PHYSICAL SOCIETY
1 Lowther Gardens, Exhibition Road,
London S.W. 7

Printed by
TAYLOR AND FRANCIS, LTD.,
RED LION COURT, FLEET STREET, LONDON E.C. 4

OFFICERS AND COUNCIL, 1944-45

PRESIDENT

E. N. DA C. ANDRADE, Ph.D., D.Sc., F.R.S.

VICE-PRESIDENTS

who have filled the Office of President

C. H. LEES, D.Sc., F.R.S. (1918-20)
Sir FRANK E. SMITH, G.C.B., G.B.E., D.Sc., LL.D., F.R.S. (1924-26)
Sir OWEN W. RICHARDSON, M.A., D.Sc., F.R.S. (1926-28)
W. H. ECCLES, D.Sc., M.I.E.E., F.R.S. (1928-30)
Sir ARTHUR S. EDDINGTON, O.M., M.A., D.Sc., LL.D., F.R.S. (1930-32)
A. O. RANKINE, O.B.E., D.Sc., F.R.S. (1932-34)
The Right Hon. LORD RAYLEIGH, M.A., Sc.D., LL.D., F.R.S. (1934-36)
T. SMITH, M.A., F.R.S. (1936-38)
ALLAN FERGUSON, M.A., D.Sc. (1938-41)
Sir CHARLES G. DARWIN, K.B.E., M.C., M.A., Sc.D., F.R.S. (1941-43)

VICE-PRESIDENTS

C. D. ELLIS, B.A., Ph.D., F.R.S. Sir EDWARD V. APPLETON, K.C.B.,
H. T. FLINT, D.Sc., Ph.D. M.A., D.Sc., LL.D., F.R.S.
N. F. MOTT, M.A., F.R.S.

HONORARY SECRETARIES

W. JEVONS, D.Sc., Ph.D. (Business) J. H. AWBERY, B.A., B.Sc. (Papers)

HONORARY FOREIGN SECRETARY

Sir OWEN W. RICHARDSON, M.A., D.Sc., F.R.S.

HONORARY TREASURER

C. C. PATERSON, O.B.E., D.Sc., M.I.E.E., F.R.S.

HONORARY LIBRARIAN

L. C. MARTIN, D.Sc.

ORDINARY MEMBERS OF COUNCIL

H. SHAW, D.Sc.	B. CHALMERS, D.Sc., Ph.D.
E. R. DAVIES, B.Sc.	B. F. J. SCHÖNLAND, O.B.E., M.A., Ph.D., F.R.S.
W. B. MANN, Ph.D.	W. S. STILES, D.Sc., Ph.D.
A. J. PHILPOT, O.B.E., M.A., B.Sc.	S. CHAPMAN, M.A., D.Sc., F.R.S.
W. D. WRIGHT, D.Sc.	C. H. COLLIE, M.A., B.Sc.
D. BRUNT, M.A., Sc.D., F.R.S.	H. R. ROBINSON, D.Sc., Ph.D., F.R.S.

EDITORS

Proceedings

J. H. AWBERY, B.A., B.Sc.

Reports on Progress in Physics

W. B. MANN, Ph.D.

COLOUR GROUP

Chairman

J. GUILD, A.R.C.S., D.I.C., F.Inst.P.

Honorary Secretary

W. D. WRIGHT, D.Sc.

OPTICAL GROUP

Chairman

A. O. RANKINE, O.B.E., D.Sc., F.R.S.

Honorary Secretary

L. C. MARTIN, D.Sc.

CONTENTS

Part 1. 1 January 1944

	PAGE
JOHN GUILD, Twentieth Duddell Medallist	<i>frontispiece</i>
D. ROGERS. A discussion of the sensitivity of a method for measuring impedance by means of transmission lines : suggestions for application to the investigation of liquids at ultra-high frequencies	1
G. S. FAWCETT. Sixty years of colorimetry	8
H. G. W. HARDING. A yellow glass filter for colour-temperature measurements	21
E. P. HARRISON and [Miss] E. HAMILTON SMITH. A new method of measuring the inclination of the earth's magnetic field	31
H. H. HOPKINS. A note on the polarisation of a plane polarized wave after transmission through a system of centred refracting surfaces, and some effects at the focus	48
E. A. OWEN and EIRWEN ST. J. WILLIAMS. X-ray study of the hysteresis effect observed in the palladium-hydrogen system	52
GORDON WILLIAMS. A new method for the measurement of impedance at ultra-high frequencies using a system of Lecher wires	63

Part 2. 1 March 1944

Lord RAYLEIGH. The spinning and floating of light bodies in an electric field : development of an experiment of Sir Isaac Newton	73
R. F. BARROW and E. E. VAGO. An emission band-system of PbSe	76
R. F. BARROW and E. E. VAGO. The absorption spectrum of SnTe	78
A. G. GAYDON. The band spectrum of N ₂ : weak systems in the visible region	85
A. G. GAYDON. The band spectrum of NO : the gamma and epsilon systems	95
L. C. MARTIN. Wide-aperture aplanatic single lenses	104
Instructor-Captain T. Y. BAKER. Tracing skew rays through second-degree surfaces	114
J. T. KENDALL. The rectifying property of carborundum	123
A. SHILTON. A machine for harmonic synthesis	130
BRUCE CHALMERS. The non-destructive testing of metallic components	132
Review	148
Recent reports and catalogues	148
Erratum	148

Part 3. 1 May 1944

H. T. FLINT. A survey of nuclear field theories	149
A. G. GAYDON. The spectrum of NO : Rotational analysis of epsilon bands and new observations on the beta and delta band-systems	160
A. R. STOKES and A. J. C. WILSON. The diffraction of X rays by distorted crystal aggregates—I	174
L. F. BATES and E. M. SOMEKH. Further investigations of the magnetic properties of non-homogeneous systems	182

	PAGE
H. PELZER. Is an interpretation of quantum phenomena by hidden parameters impossible?	195
J. C. JAEGER. Note on a problem in radial flow	197
Discussion on band spectra and energies of dissociation of diatomic molecules	204
Obituary notices :	
GEORGE LEONARD ADDENBROOKE	213
ROBERT MORRISON ABRAHAM	214
HUGH FRANK NEWALL	215
ANTHONY CHARLES SHEARMAN	216
ARTHUR WILLIAM CLAYDEN	217
Reviews of books	217
Recent reports and catalogues	220

Part 4. 1 July 1944

J. H. HILDEBRAND. The liquid state. (Twenty-eighth Guthrie Lecture.)	221
F. LLEWELLYN JONES. The mobilities of electrons in helium	239
H. MIKHAIL and Y. L. YOUSEF. The absolute measurement of large magnetic fields by a null method	249
W. S. STILES and T. SMITH. A mean scotopic visibility curve	251
C. H. COLLIE. On electrical resonance	255
A. J. PHILPOT. Physics and the scientific instrument industry	263
Discussion on paper by J. T. KENDALL, <i>Proc. Phys. Soc.</i> 56 , 123 (1944), entitled "The rectifying property of carborundum"	270
Discussion. Contact lenses	272
Discussion. The measurement of aberrations	277
Reviews of books	290
Recent reports and catalogues	292

Part 5. 1 September 1944

H. H. EMSLEY. Some notes on space perception	293
H. G. W. HARDING. Colours of total radiators expressed on the C.I.E. trichromatic system for the temperature range 1500–10–9000° K. ($C_2=14384.8$)	305
W. S. STILES. Current problems of visual research.	329
Discussion on paper by J. C. JAEGER, <i>Proc. Phys. Soc.</i> 56 , 197 (1944), entitled "Note on a problem in radial flow"	356
Corrigenda	356

Part 6. 1 November 1944

S. WHITEHEAD. An approximate method for calculating heat flow in an infinite medium heated by a cylinder	357
C. G. WYNNE. Vignetting	366
L. S. GODDARD. The computation of electron trajectories in axially symmetric fields	372
L. S. GODDARD and O. KLEMPERER. Electron ray tracing through magnetic lenses	378
Discussion on paper by A. J. PHILPOT, <i>Proc. Phys. Soc.</i> 56 , 268 (1944), entitled "Physics and the scientific instrument industry"	396

Contents

v

Obituary notices :	PAGE
Sir CHARLES BOYS, F.R.S.	397
EVAN JENKIN EVANS	404
ARTHUR S. NEWMAN	406
DONALD CLIVE CHALLIS, D.F.M.	406
Sir THOMAS RANKEN LYLE, F.R.S.	407
Reviews of books	409
Recent reports and catalogues	414
Erratum	414
Index to Volume 56	415
Index to reviews of books	420

PROCEEDINGS AT THE MEETINGS OF THE PHYSICAL SOCIETY

SESSION 1943-44

12 May 1943 *

The twelfth meeting of THE COLOUR GROUP, at the Lighting Service Bureau, Savoy Hill, London W.C. 2, Mr. J. Guild being in the Chair.

A lecture entitled "Sixty years of colorimetry" was delivered by G. S. Fawcett, and was followed by an informal discussion.

* The record of this meeting was inadvertently omitted from the *Proceedings*, vol. 55, page ix (November 1943).

9 September 1943

The thirteenth meeting of THE COLOUR GROUP, at the Science Museum, London S.W. 7 Mr. J. Guild being in the Chair.

A lecture entitled "A review of the theory of colour photography" was delivered by J. B. Reid, B.Sc., and was followed by an informal discussion.

17 September 1943

The ninth meeting of THE OPTICAL GROUP, at the National Institute for Medical Research, London N.W. 3, Professor A. O. Rankine being in the Chair.

Demonstrations of the electron microscope and other apparatus were given, after introductory talks, by F. W. Cuckow, J. Smiles and R. G. McFarlane on the electron microscope and its uses in biological research, and by J. W. Perry on the Tiselius electrophoresis apparatus.

15 October 1943

Science Meeting, at the Royal Institution, Albemarle Street, London W. 1, the President, Professor E. N. da C. Andrade, being in the Chair.

The following were elected to Fellowship: Thomas Crowdy, John Robert Mills, Marion Morris, Ronald Bradley Shepherd, Robert Simpson Silver.

The eighth Parsons Memorial lecture was delivered by the Right Hon. Lord Rayleigh, D.Sc., Sc.D., LL.D., F.R.S., who took as his subject "Optical topics, in part connected with Charles Parsons".

5 November 1943

Science Meeting, at the Imperial College, London S.W. 7, the President, Professor E. N. da C. Andrade, being in the Chair.

The following were elected to Fellowship: Norman Clarke, John Rupert Davy, Dennis Gabor, Edward Albert James Hall.

It was announced that the Council had elected the following to Student Membership: Alan Barker, Antony Harley Boston, James Macdonald Cassels, Philip Lanyon Chirgwin, Dennis Alan Coster, David V. Crawford, James Maurice Daniels, Michael Davis, Denis Thomas Richard Dighton, James Wynne Dungey, Desmond J. A. Mansell, Geoffrey Harwood Moss, Ralph William Nicholls, James Nicol, Patrick John Oram, Norman Edward Rider, D. E. U. Ridout, Douglas Yeo.

A lecture on "The non-destructive testing of metallic components" was delivered by Bruce Chalmers, D.Sc., Ph.D., and was followed by an informal discussion.
